



RIALTO.AI

Q4 2017 Report

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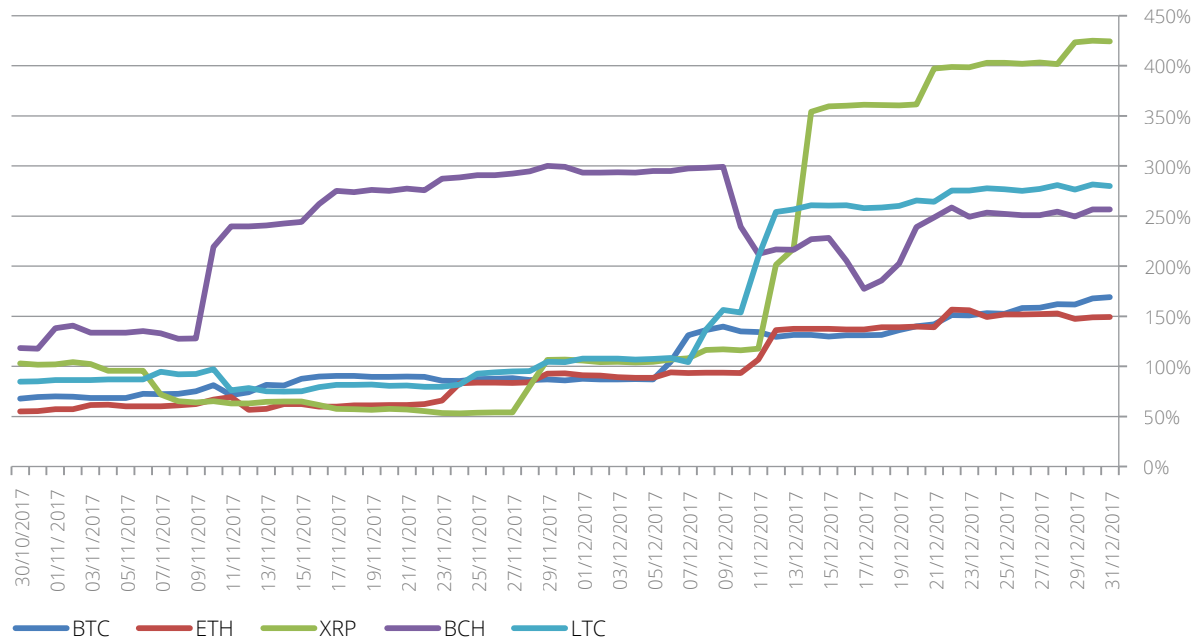
MARKET REPORT

During the Q4 2017, the overall market capitalization of the crypto market increased 4 times, from \$147 billion, to almost \$600 billion. Top 10 cryptocurrencies observed significant additions and deletions. New entrants are Cardano and Stellar, while Monero and NEO fell out of the top league.

TOP 10 CRYPTOCURRENCIES BY FREE-FLOAT MARKET CAPITALIZATION, OCT 1 ST	FREE-FLOAT MARKET CAPITALIZATION, BILLION USD	TOP 10 CRYPTOCURRENCIES BY FREE-FLOAT MARKET CAPITALIZATION, DEC 31 ST	FREE-FLOAT MARKET CAPITALIZATION, BILLION USD
Bitcoin	\$71.7	Bitcoin	\$220.9
Ethereum	\$28.4	Ripple	\$82.2
Ripple	\$7.6	Ethereum	\$69.8
Bitcoin Cash	\$7.6	Bitcoin Cash	\$41.5
Litecoin	\$2.9	Cardano	\$18.0
Dash	\$2.5	Litecoin	\$12.0
NEM	\$2.1	IOTA	\$9.6
IOTA	\$1.7	NEM	\$8.4
NEO	\$1.6	Dash	\$7.9
Monero	\$1.4	Stellar	\$5.8

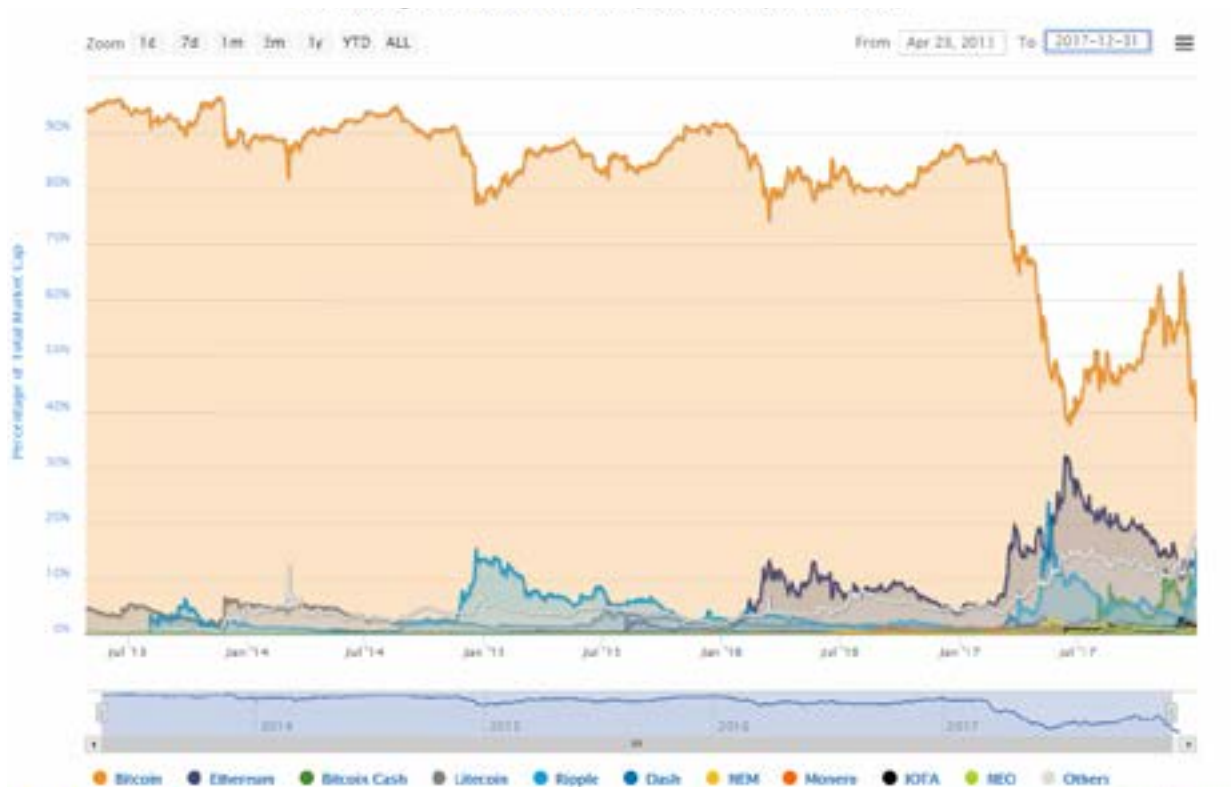
During the second half of the quarter we have witnessed a considerable bull run as the cryptocurrencies attracted the interest of general public and thus generally unsophisticated traders. Relatively large price swings were observed, these, however, generally pointed upwards. This bull run ended in early January when rumors emerged that South Korea is introducing a blanket ban on cryptocurrency trading. The rumors were, however, proven to be false few days later. The market lost 20% in the matter of few days, falling from the all-time high of cca. \$820 billion to cca. \$660 billion. Additionally, on December 20th, the Litecoin founder, Charlie Lee, [announced](#) that he has sold his entire LTC holdings, causing some turmoil in the market, which, coupled with later news about South Korea and IRS aggressive stance on crypto gains taxation, caused a significant drop in overall market value at the end of the quarter.

Trailing 30 Days Volatility (Standard Deviation of Returns), Annualized



Bitcoin's status as a reserve cryptocurrency has begun to diminish, with its dominance (defined as free float market capitalization of BTC as a share of total free float crypto market capitalization) hovering around 35% in a bear trend. From the highest BTC dominance during the quarter at 65% on December 8th, the overall indicator has declined to 38.8% until December 31st, and continued the downward trend well into the 2018. At the time of writing (January 14th 2018) it is showing a value of 32%.

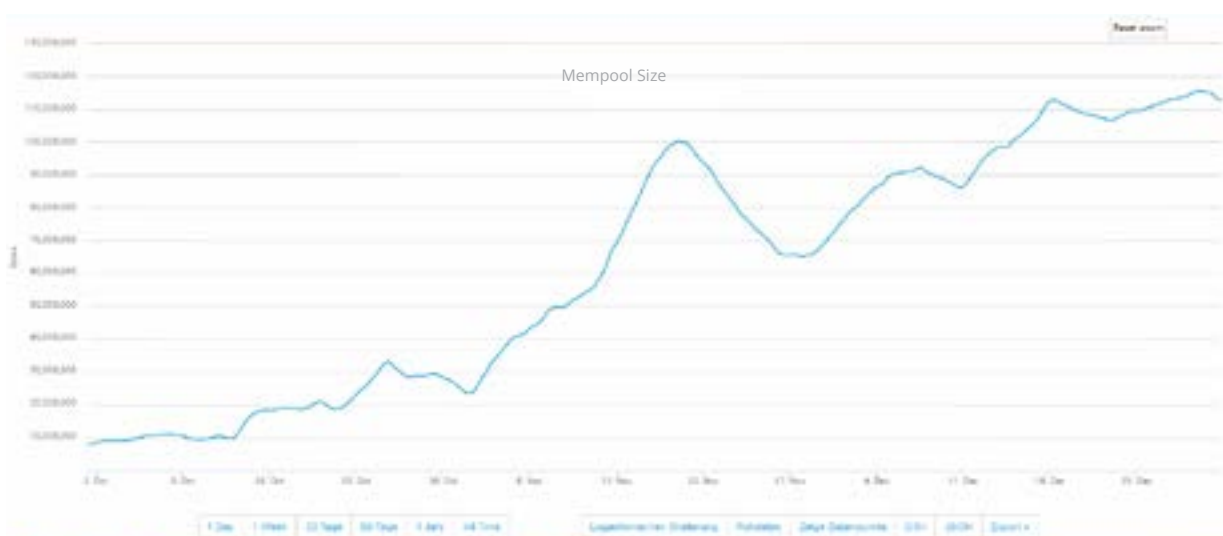
Percentage of Total Market Capitalization (Dominance)



Source: coinmarketcap.com

While the declining dominance indicator is straightforward to interpret, reasons for this decline are somewhat less clear. At its highest peak during the quarter and since inception (December 22nd), there were over 260,000 pending BTC transactions.¹

Size of the BTC Memory Pool in Bytes, Trailing 7 Days, Simple Daily Average



Source: blockchain.info

¹ <https://dedi.jochen-hoenicke.de/queue/#3m>

At the time of writing (January 14th), the market fees for a BTC transaction were 460 satoshis/byte. For the median transaction size of 226 bytes, this results in a fee of 103,960 satoshis (USD 14)². At its highest peak, on December 22nd, average BTC transaction costed cca. \$55.³

With BTC being essentially unusable in its current state and with no solution in sight in the near future from the BTC core team, the market began diversifying into other cryptocurrencies for value transfers, most notably ETH, BCH, LTC, and some new contenders, such as XRB.

Paerson's Correlation, USD Daily Returns, Q4 2017

	BTC	ETH	XRP	BCH	LTC
BTC		0.148051	-0.05361	-0.14238	0.257697
ETH			0.321305	0.240815	0.683257
XRP				0.094659	0.194144
BCH					0.040022
LTC					

Overall, correlations, at least among the more well-known coins, are lowering as investors started looking past Bitcoin and diversifying into other coins. Especially interesting are negative correlations between BTC and XRP, and BTC and BCH. XRP targets a completely different market segment, which is essentially uncorrelated with BTC acceptance, while BCH in a sense cannibalizes BTC market share and negative correlation is expected. Overall, relatively low correlations make a diversification within the asset class very favorable.

Crypto market attracted the interest of the traditional financial world. On December 18th, Chicago Mercantile Exchange launched first ever BTC future contract. These are cash-settled and with high margin requirements, setting initial margin at 100% for hedger and 110% for speculator, and maintenance margin at 43%.⁴ This instrument is still waiting to lift off – at the time of writing, daily volume of all futures with delivery dates up to 6 months from now was 963 contracts equaling 4815 BTC, dwarfing the spot market volume of cca. 820,000 BTC.

The market value of all issued BTC and ETH Exchange Traded Notes by Coinshares (SE0007126024, SE0007525332, SE0010296574, SE0010296582, most well-known crypto trackers, all tradable on Nasdaq OMX Stockholm, recently also listed on Börse Stuttgart and Tradegate) is just shy of \$8 billion as of January 15th.

In November, the Internal Revenue Service published a [clarification](#) stating that every trade, even if it is crypto-to-crypto and not only crypto-to-fiat, is a taxable event. Leaving a lot of aspects undefined, this caused some irritation on the market as the fragmented market microstructure makes proper reporting very difficult. We believe that, in the short run, this will cause a drop in liquidity in the North American market segment, while other countries (especially Europe and East Asia) might try to overtake the US as a perceived crypto cluster and industry-friendly environment.

Overall, crypto is gaining traction both among general public and institutional investors, setting place for a very interesting Q1 2018.

² <https://bitcoinfees.earn.com/#fees>

³ <https://bitinfocharts.com/comparison/bitcoin-transactionfees.html>

⁴ <http://www.cmegroup.com/education/cme-bitcoin-futures-frequently-asked-questions.html>

PROGRESS REPORT

ARBITRAGE AND MARKET MAKING

RIALTO.AI trading system is based on test and deployed environments. The test environment represents a variation of the main trading algorithm where different optimization strategies are being tested as well as addition of new markets and cryptocurrencies. Once the testing is successfully finished, the process can be used and deployed into the main algorithm. The data below is aggregated for both bots.

Arbitrage and market making main bot has been running in since October 1st, 2017. Automated system is written in Java 8. The implementation uses multi-threaded technology and asynchronous calls, wherever it is optimal. Processes are fully decoupled, and the architecture is modular with high scalability. New markets and cryptocurrencies can be added through the plugin system. Data is stored by separate decoupled processes into MySQL Server Cluster, as well as in Elastic Search.

RIALTO.AI is currently engaging in arbitrage and market making on six exchanges, trading XRP, EUR, USD, ETH and BTC. XRP pairs combined represent 80% of total volume traded. As the blockchain transaction times are significantly shorter in the case of the XRP, hedging open positions is a lot more efficient.

	Volume USD	Average USD	Count
XRP/EUR	58,922,849.53	10,481.49	9,684
XRP/USD	34,507,435.24	6,083.77	6,458
XRP/BTC	57,096,341.16	9,863.75	8,650
XRP/ETH	10,729,865.56	9,615.34	1,512
XRP/DASH	137,352.66	1,856.11	74
EUR/BTC	7,023,027.22	2,121.41	5,523
EUR/ETH	4,026,387.52	1,913.66	3,474
USD/BTC	8,078,379.32	2,157.13	5,040
USD/ETH	3,451,071.24	1,985.88	3,045
USD/BCH	4,589,371.96	2,044.42	3,640
USD/DASH	4,384.52	257.91	17
BTC/ETH	8,205,047.50	4,057.24	3,704
BTC/BCH	3,799,848.54	1,706.60	5,252
BTC/DASH	316,228.59	672.83	470
ETH/BCH	166,756.74	1,050.43	179
ETH/DASH	913.46	228.37	4
Total	204,798,260.75	5,124.24	58,426
of which MM			20,038
of which hedging			38,388

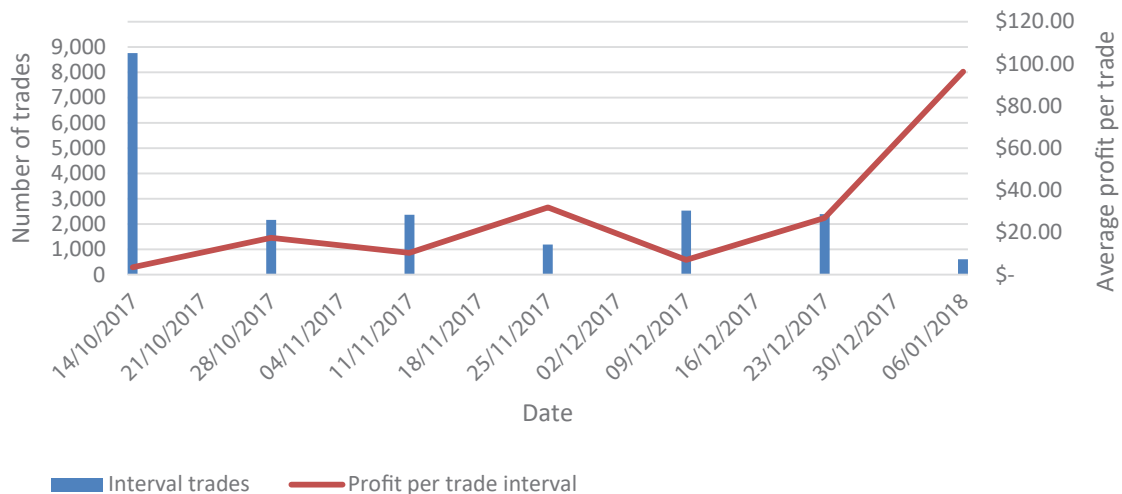
USD conversion rates
Jan 11th 2018.

Altogether, the algorithm has executed 20,038 market making and 34,326 hedging trades, earning \$274,316 in the Q4, 2017 and thus averaging \$ 13.69 per market making trade.

Due to explosive overall crypto market growth in the last quarter, and consequently growth of the Total Assets, the utilization of Total Assets remains low, 0-25%. By holding a relatively minor share of the pool on the exchanges and frequently rebalancing the assets, we mitigate the counterparty risk.

The bot has performed 8,736 market making trades in the first two weeks of operations (October 1st – October 14th), the most in a two week interval in the quarter, while only performing 610 trades in the two weeks from December 24th to January 6th. Trades in other intervals averaged at around 2,400, with a notable exception from November 12th to November 25th when only cca. 1,200 trades were executed.

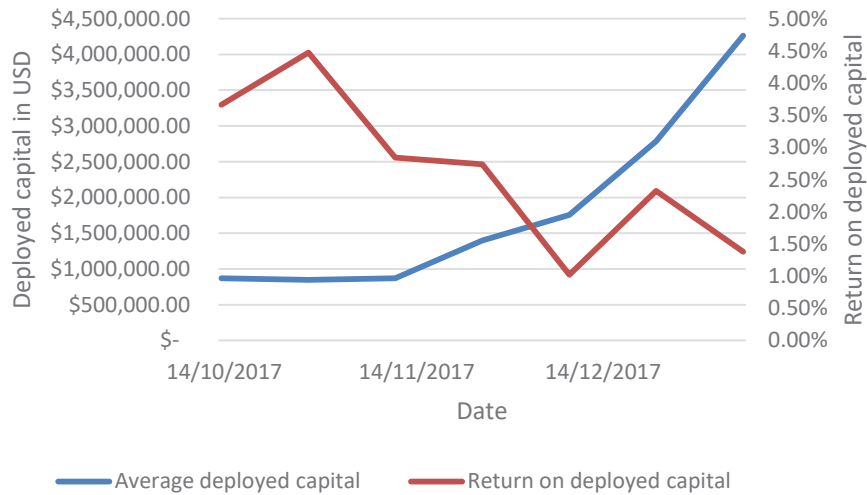
Trades in 2-week Intervals



We have been steadily increasing the deployed capital in US Dollars. At the end of the quarter, the deployed capital amounted to \$4.3 million. Return on deployed capital somewhat declined, from the highest point of 4.5% in the second two-week period of operations (October 15th – October 28th) to 1.4% at the end of the quarter.

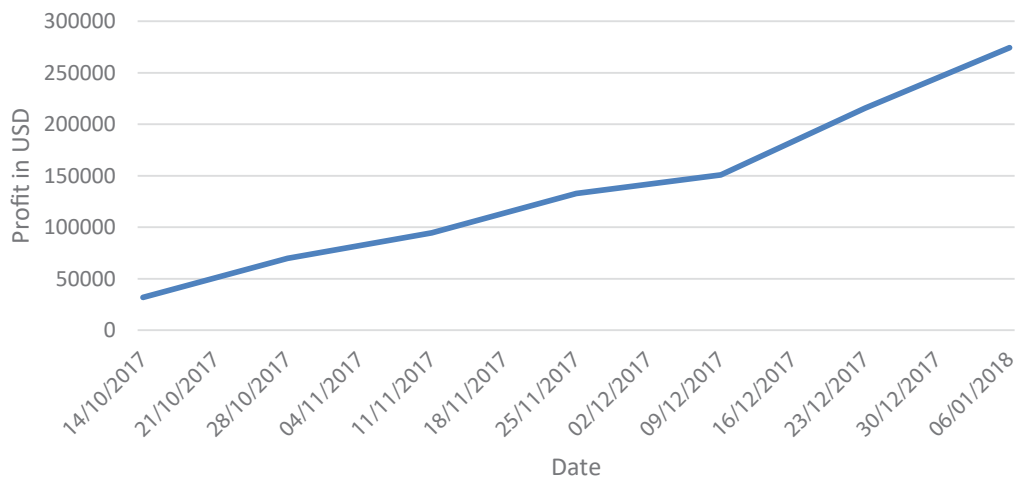
68.5% On average, the market making algorithm achieved 2.6% return on deployed capital in each 2 week period, annualized to 68.5%.

Deployed Capital Analysis



Absolute profit in US Dollars for the period (up to and including January 6th) is \$274,316. Crypto profits have been converted into fiat at the end of each trading day, making the above number insensitive to crypto price movements.

Cumulative profit



After the start of the operation of the main algorithm, we began testing an extended and improved version of the market-making algorithm, utilizing multi order book hedging. The algorithm is designed in order to minimize the downtime risk exposure and latency in execution of trades. It is decreasing the dependency on a single exchange at an event of highest spread with bridging trades to a total market order book ledger.

Dash has been added to the set of cryptocurrencies in late November. We converted a minor amount of ETH and will be ramping up the market-making activities as the overall liquidity of Dash pairs increases. Litecoin will follow in the near future. Next in line in the roadmap to include ZEC, XMR, EOS, NEO, and BTG.

Market making on altcoins with lower capitalization was not part of the trading strategy so far. We plan to perform due diligence on the 10 most attractive pairs based on the spreads, liquidity, and volatility. Additionally, we intend to include altcoin set to the test environment until the end of Q1 2018.

AI TRADING BOT

Development of the AI Trading Bot started in October, 2017. The team consists of a quantitative trader and three data scientists. Over 20 strategies have been prepared and back tested. The strategy needs to pass rigorous risk metrics in order to be eligible for test and then deployment phase. So far 4 long-only strategies have entered the test phase and they can be applied to the largest crypto-fiat pairs but only to the top 5 exchanges with the greatest liquidity. Since December 1st we have been running four strategies in real-time trading with an amount less than \$50,000. Trading with the test amount of capital resulted in a 16.74% return in one month. The testing phase will continue to run until the end of Q1 2018 in order to increase the number of strategies added and meet the statistical significance parameters required for the deployment phase. The team will further focus on developing strategies based on machine learning techniques and will further pursue the goal of developing a trading model with ML optimized, quantitative, news trading, and blockchain information parameters. AI Trading Bot is a research based project marked with an unpredictable timeline for achieving deployment phase.

FUTURE PLANS

In the near future, we plan to shift the arbitrage and market-making deployed capital to the multi-order book bot. Its increased efficiency (profit per trade) and operational fluidity make it more suitable choice for our arbitrage and market-making activities.

With the introduction of the platform later in Q1 2018, users will be able to manage the use of algorithms and allocation of their assets between idle state, arbitrage and market making and predictive trading bot. More on the functionality and design features of the platform can be read [here](#).

Our focus remains on increasing the utilization time of the deployed algorithms, thus extending the operations of the arbitrage and market making to 24/7. Due to current state of the market (frequent network congestions, occasional exchange downtime), the bot execution metrics and transfers in progress are constantly monitored.

We will continue adding new exchanges and currencies to increase the utilization of the algorithms. These, however, have to pass technical compliance review for exchanges, as well as liquidity and market availability requirements for cryptocurrencies.

We have been providing data feed to [Hedge Project](#) for the calculation of Buchman Crypto indices. Hedge will be introducing passive indexed investment vehicles (CTIs) in the near future.

RIALTO.AI and Hedge have been discussing possibilities for further cooperation in the field of designated market making and authorized participation for the CTI trading. This would position us with unique access for arbitraging CTIs and predictable trade margins at monthly rebalancing event. The introduction of the CTIs was expected in Q2 2018.

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